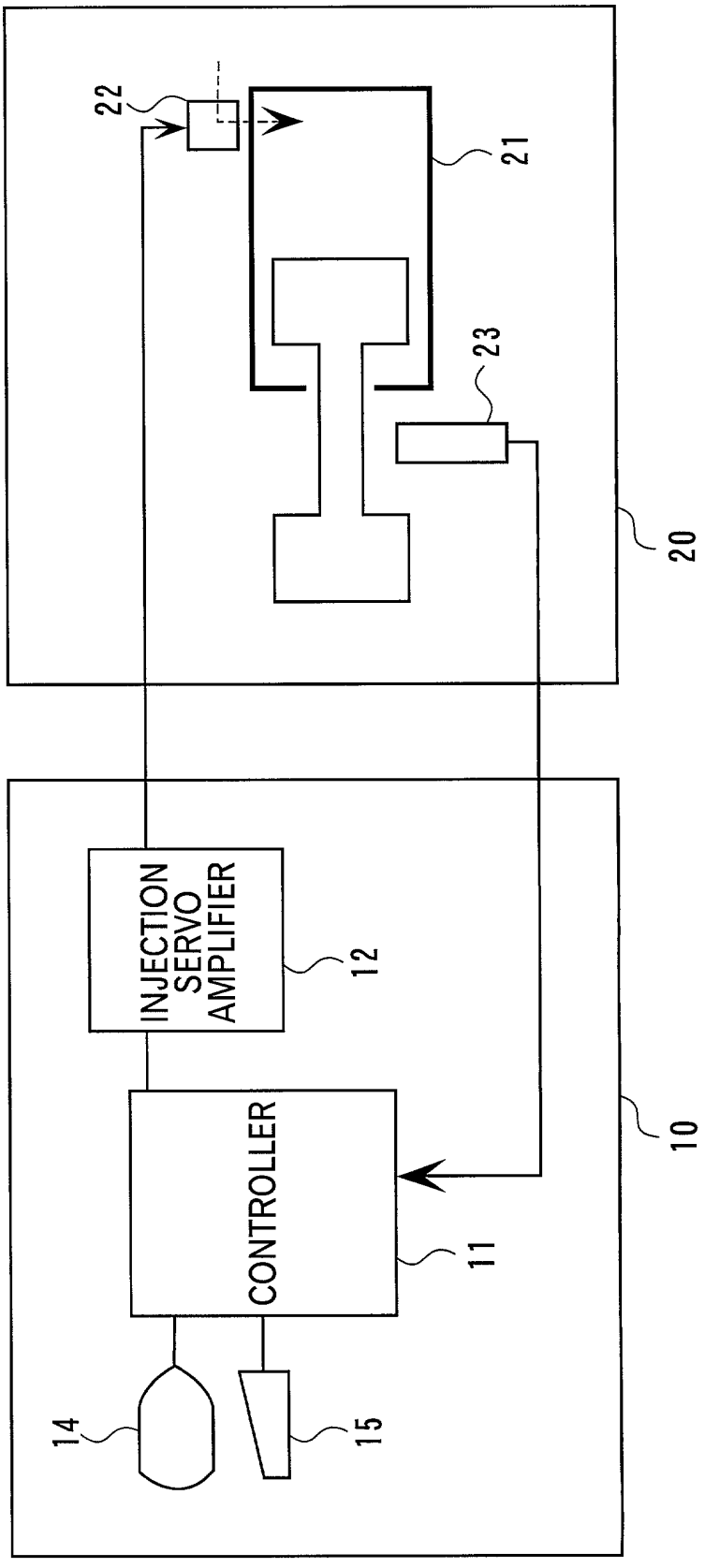
FIG. 1


22
21
23
20
INJECTION SERVO AMPLIFIER
12
CONTROLLER
11
10
14
15

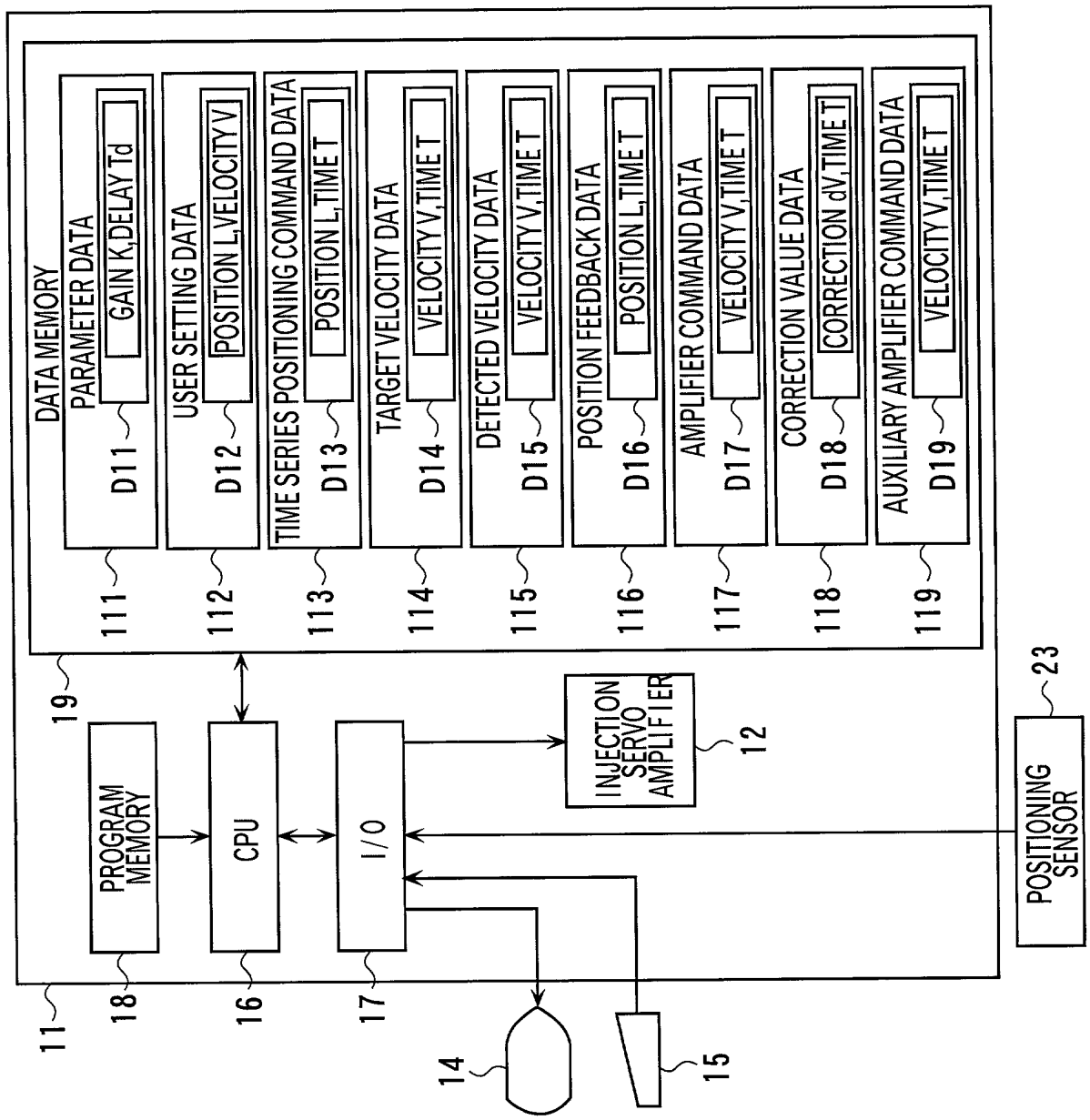

DATA MEMORY
PARAMETER DATA
GAIN K,DELAY Td
D11
111
USER SETTING DATA
POSITION L,VELOCITY V
D12
112
TIME SERIES POSITIONING COMMAND DATA
POSITION L,TIME T
D13
113
TARGET VELOCITY DATA
VELOCITY V,TIME T
D14
114
DETECTED VELOCITY DATA
VELOCITY V,TIME T
D15
115
POSITION FEEDBACK DATA
POSITION L,TIME T
D16
116
AMPLIFIER COMMAND DATA
VELOCITY V,TIME T
D17
117
CORRECTION VALUE DATA
CORRECTION dV,TIME T
D18
118
AUXILIARY AMPLIFIER COMMAND DATA
VELOCITY V,TIME T
D19
119
19
PROGRAM MEMORY
18
CPU
16
I/O
17
11
INJECTION SERVO AMPLIFIER
12
POSITIONING SENSOR
23
14
15

FIG. 2

FIG. 3

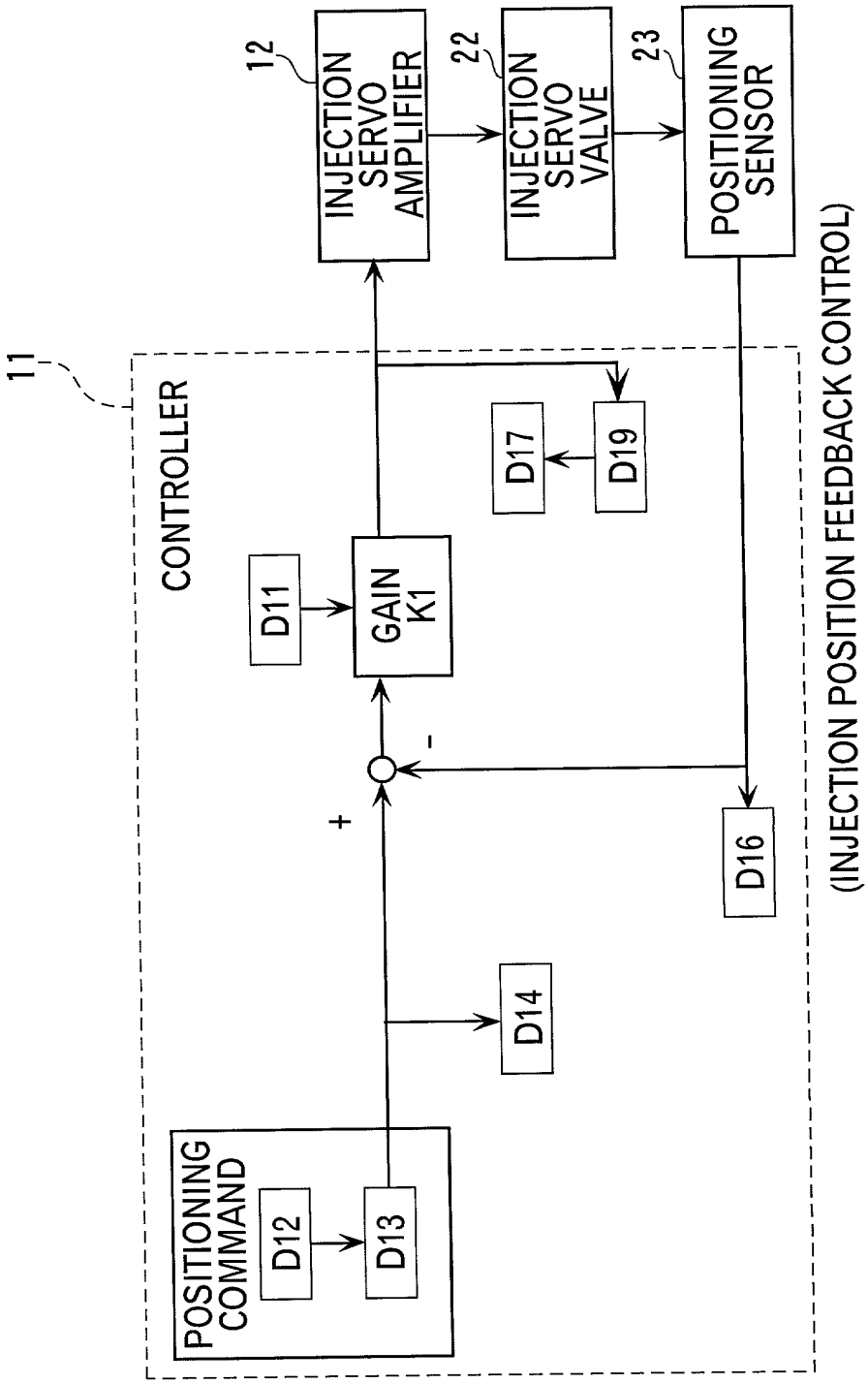

11
CONTROLLER
12
INJECTION SERVO AMPLIFIER
22
INJECTION SERVO VALVE
23
POSITIONING SENSOR
D11
GAIN K1
D17
D19
D16
D14
POSITIONING COMMAND
D12
D13
+
-
(INJECTION POSITION FEEDBACK CONTROL)

FIG. 4

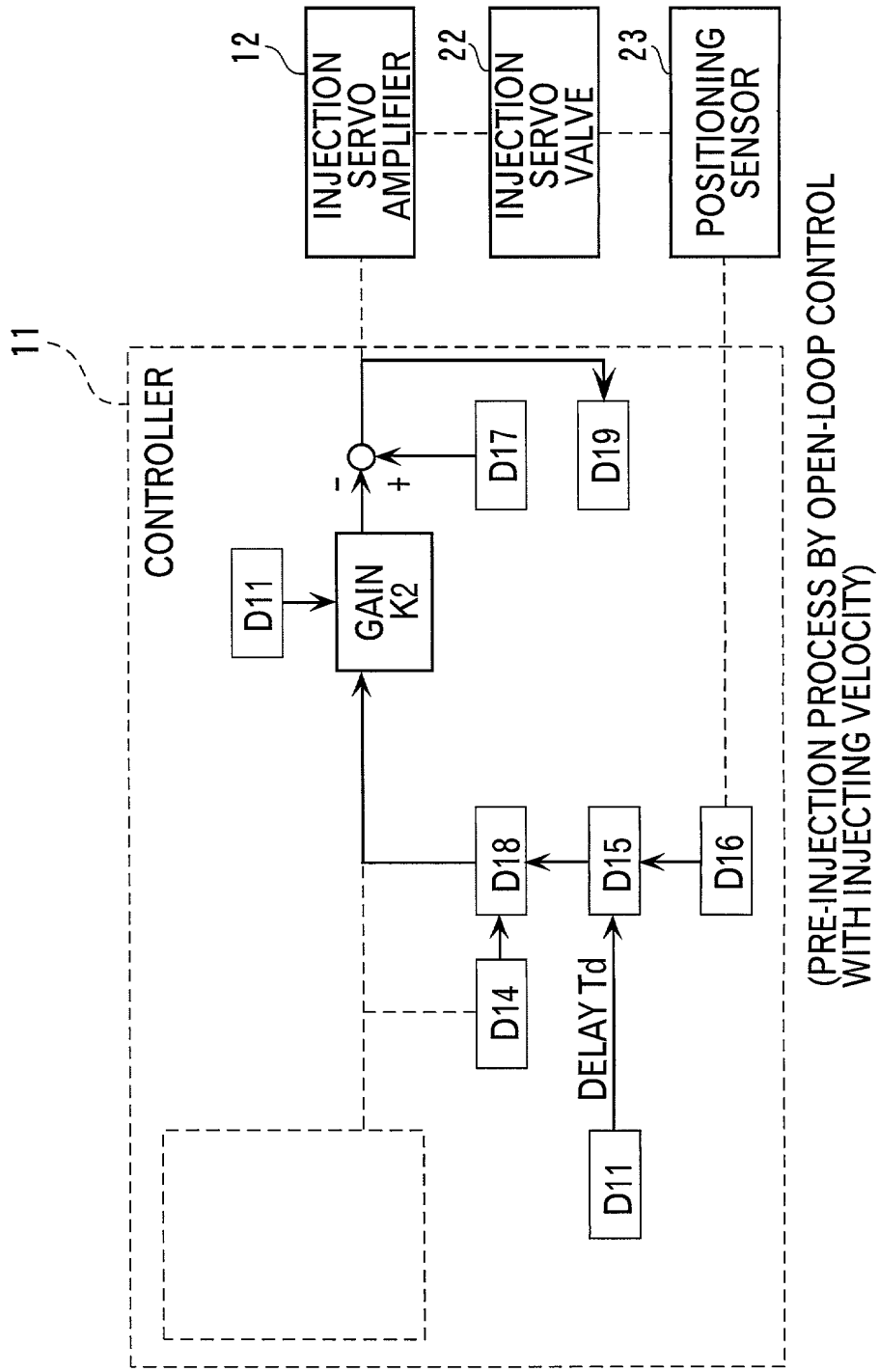

12
INJECTION SERVO AMPLIFIER
22
INJECTION SERVO VALVE
23
POSITIONING SENSOR
11
CONTROLLER
D11
GAIN K2
-
+
D17
D19
D18
D15
D16
D14
DELAY Td
D11
(PRE-INJECTION PROCESS BY OPEN-LOOP CONTROL WITH INJECTING VELOCITY)

FIG. 5

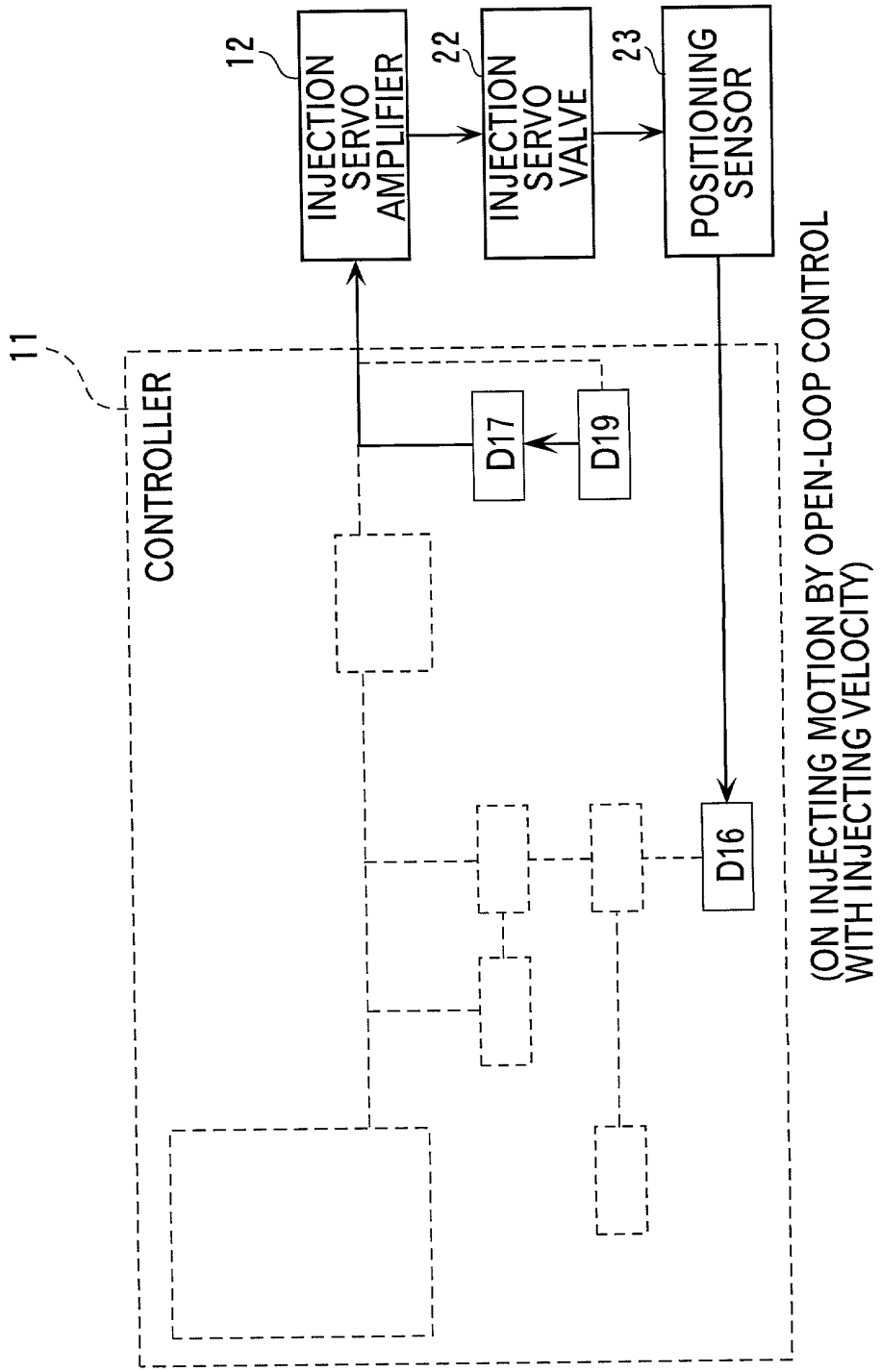

12
INJECTION SERVO AMPLIFIER
22
INJECTION SERVO VALVE
23
POSITIONING SENSOR
11
CONTROLLER
D17
D19
D16
(ON INJECTING MOTION BY OPEN-LOOP CONTROL WITH INJECTING VELOCITY)

FIG. 6

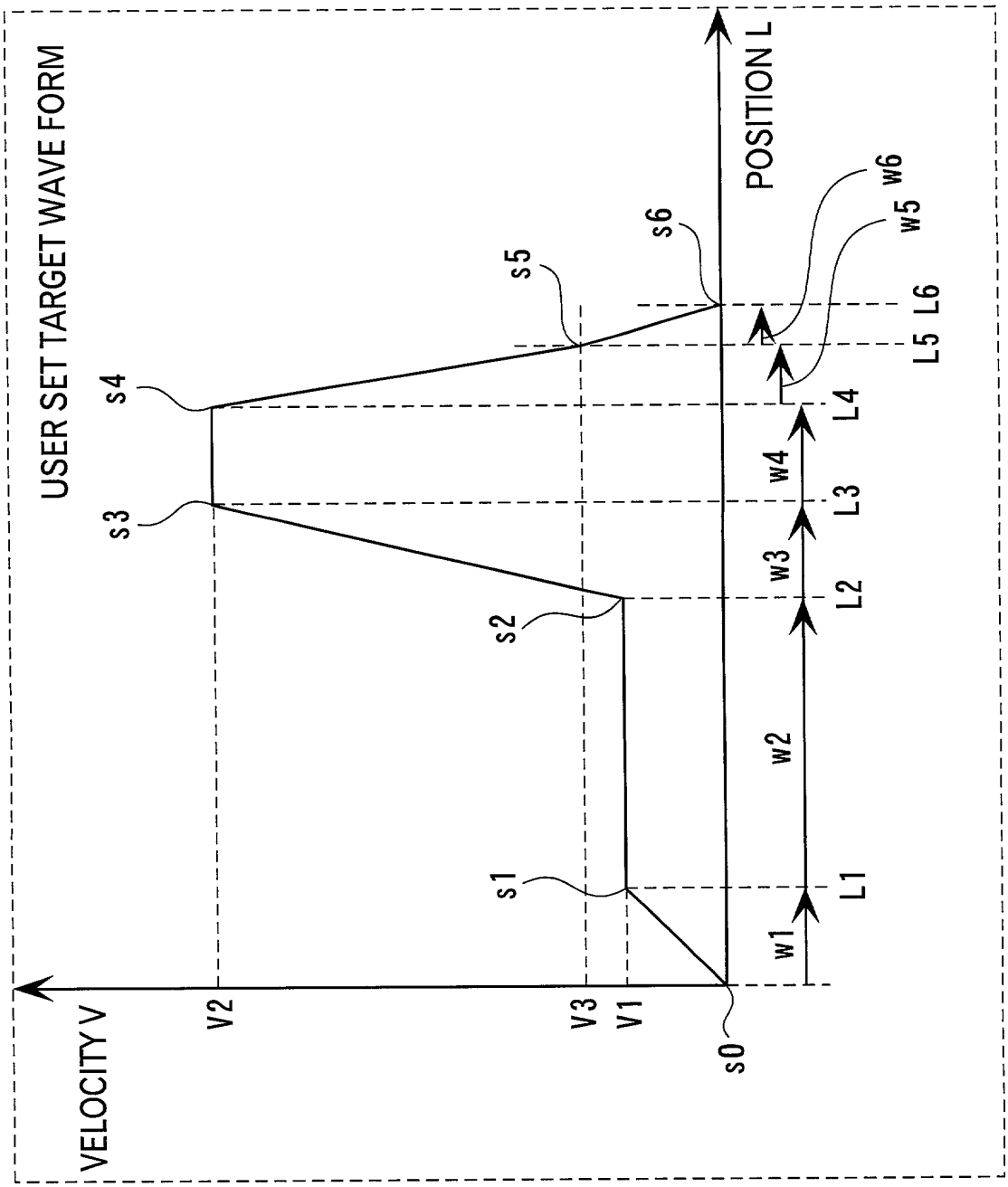

USER SET TARGET WAVE FORM
VELOCITY V
POSITION L
V2
V3
V1
s0
s1
s2
s3
s4
s5
s6
w1
w2
w3
w4
w5
w6
L1
L2
L3
L4
L5
L6

FIG.7

D12

TARGET WAVE FORM DATA SETTING TABLE

POINT	s0	s1	s2	s3	s4	s5	s6
POSITION	0	L1= w1	L2= w1+w2	L3= w1+…+w3	L4= w1+…+w4	L5= w1+…+w5	L6= w1+…+w6
VELOCITY	0	V1	V1	V2	V2	V3	0

FIG. 8

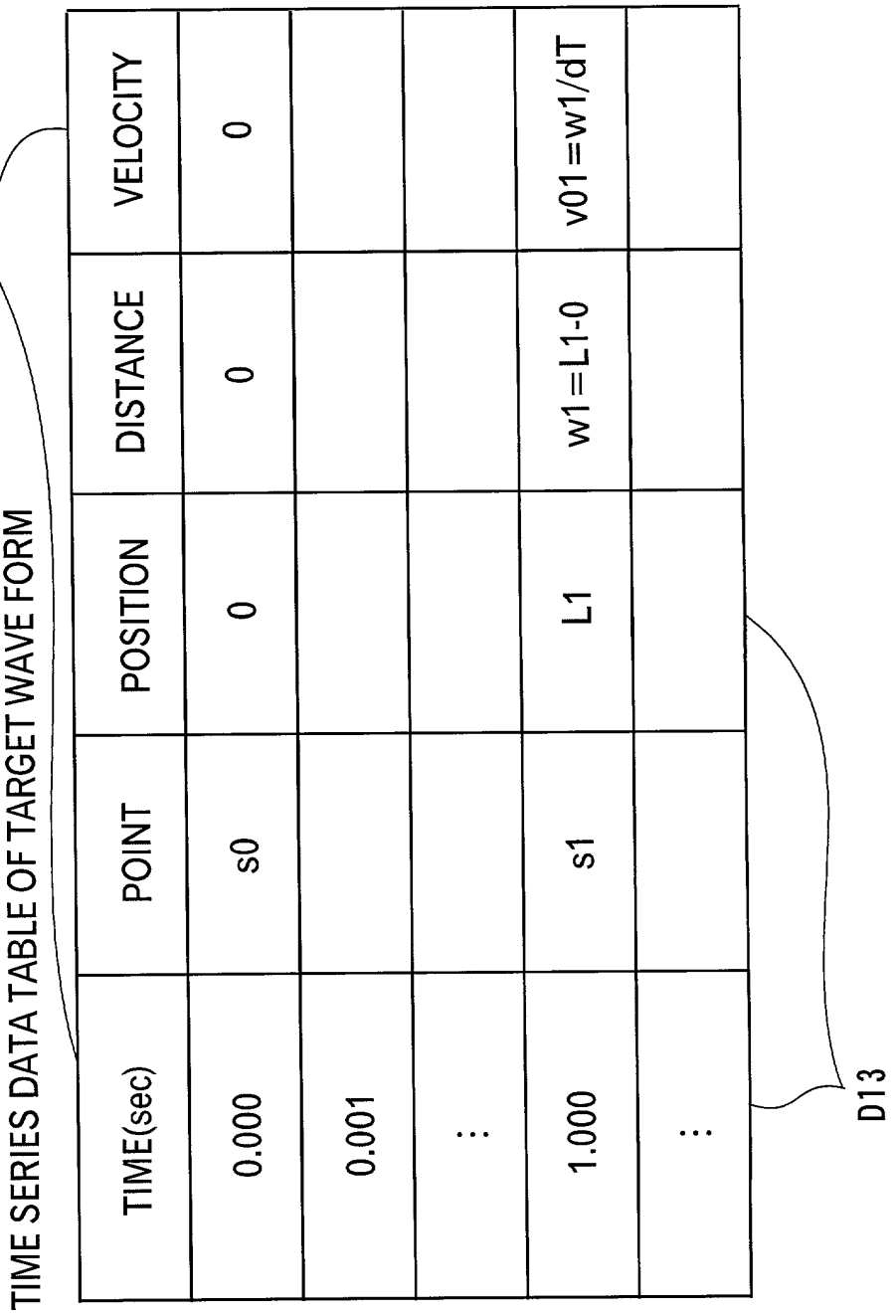

TIME SERIES DATA TABLE OF TARGET WAVE FORM
D14
D13
TIME(sec)
POINT
POSITION
DISTANCE
VELOCITY
0.000
s0
0
0
0
0.001
1.000
s1
L1
w1=L1-0
v01=w1/dT

FIG. 9

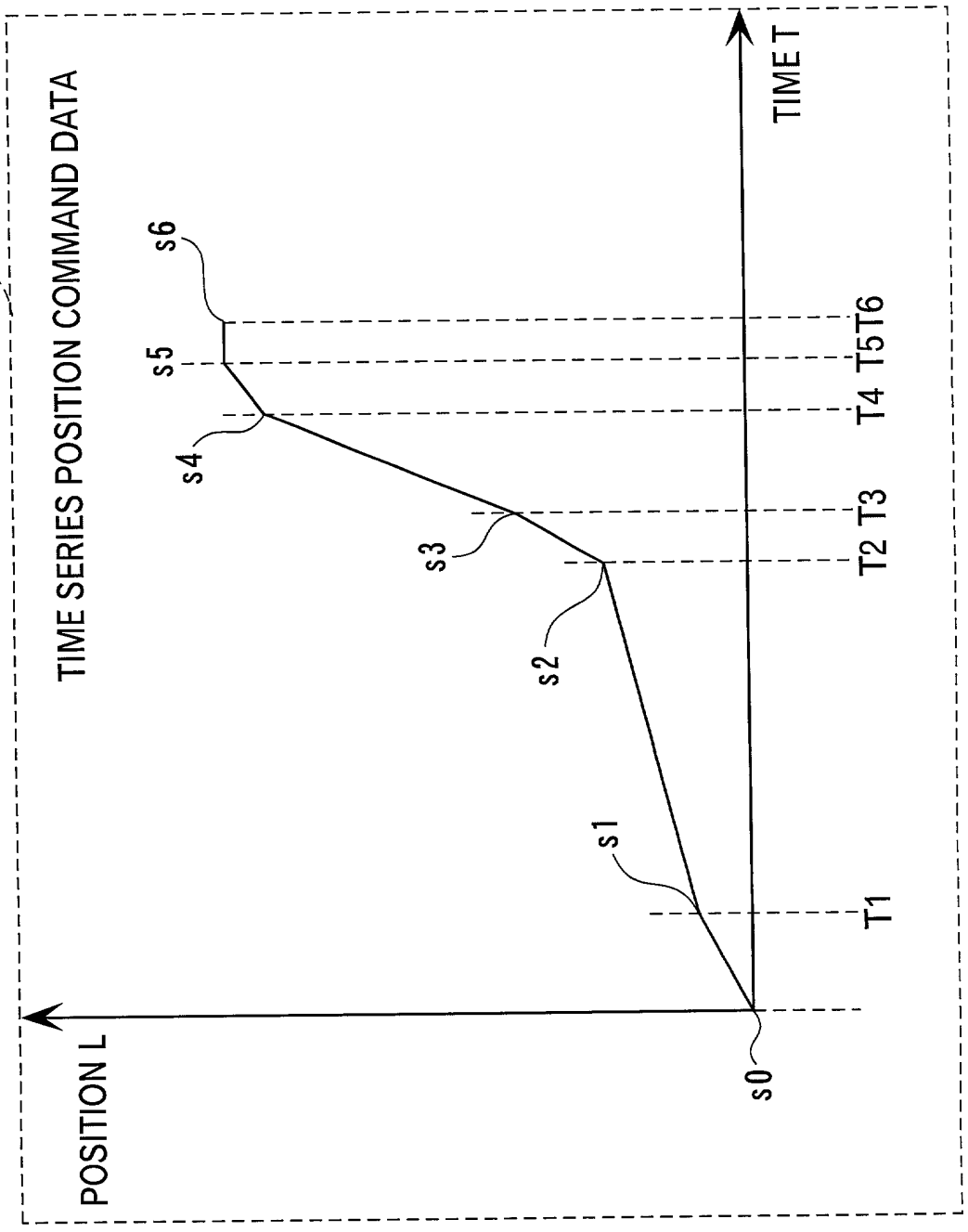

D13
TIME SERIES POSITION COMMAND DATA
POSITION L
TIME T
s0
s1
s2
s3
s4
s5
s6
T1
T2 T3
T4 T5T6

FIG.10

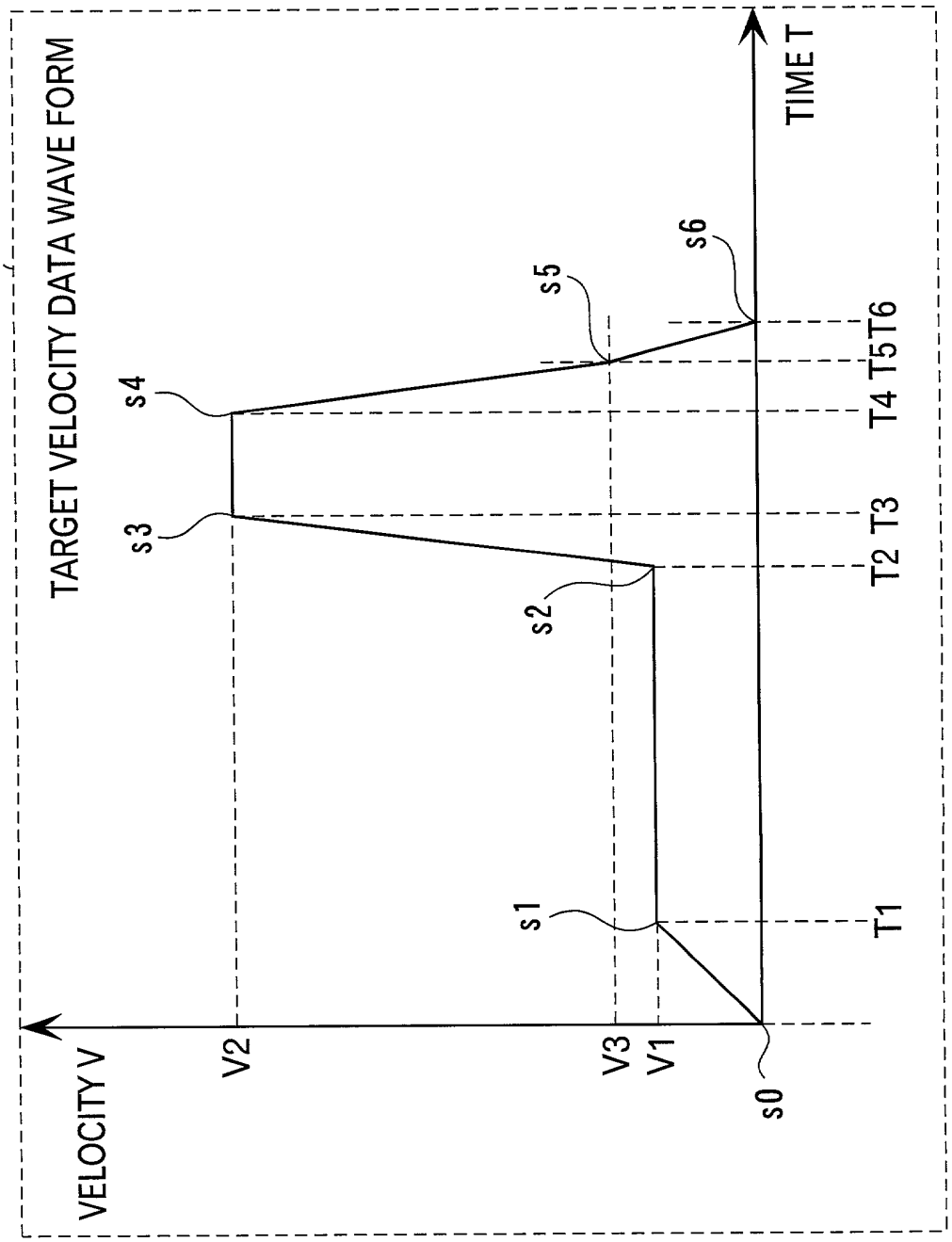

D14
TARGET VELOCITY DATA WAVE FORM
TIME T
VELOCITY V
s0
s1
s2
s3
s4
s5
s6
V1
V2
V3
T1
T2 T3
T4 T5T6

FIG.11

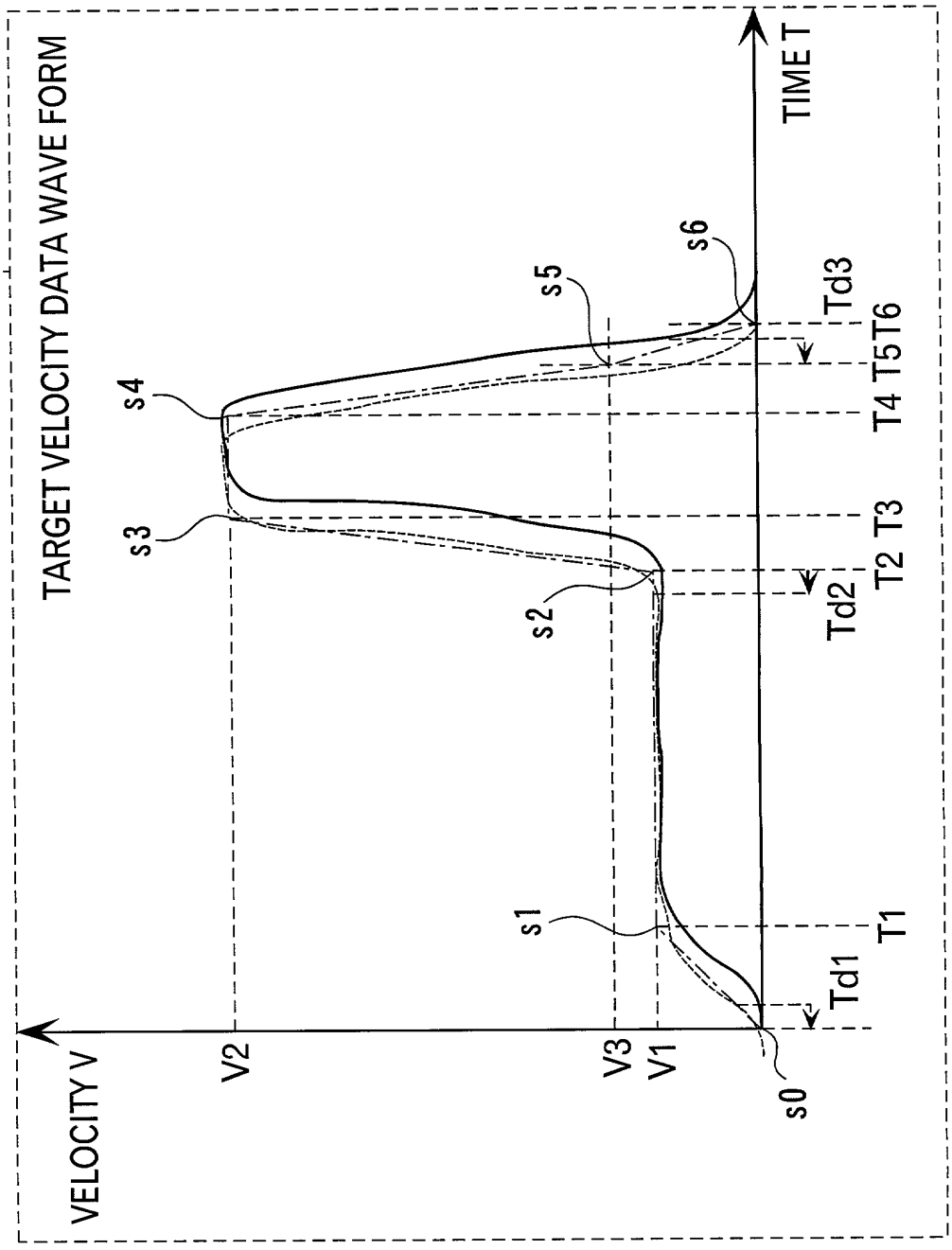
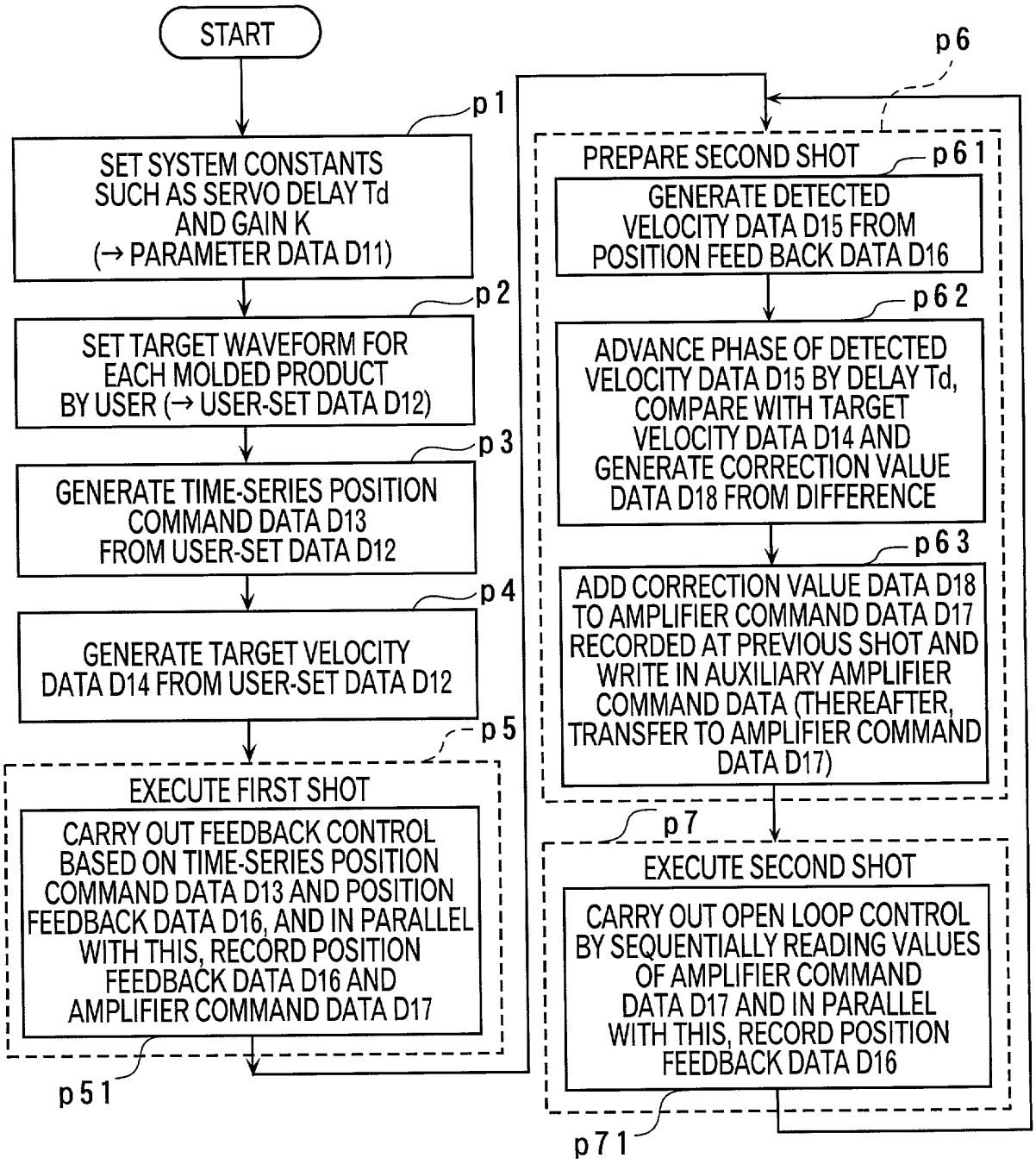

D14
TARGET VELOCITY DATA WAVE FORM
TIME T
VELOCITY V
V2
V3
V1
s0
s1
s2
s3
s4
s5
s6
Td1
Td2
Td3
T1
T2 T3
T4 T5T6

FIG. 12


START
p1
SET SYSTEM CONSTANTS SUCH AS SERVO DELAY Td AND GAIN K (→ PARAMETER DATA D11)
p2
SET TARGET WAVEFORM FOR EACH MOLDED PRODUCT BY USER (→ USER-SET DATA D12)
p3
GENERATE TIME-SERIES POSITION COMMAND DATA D13 FROM USER-SET DATA D12
p4
GENERATE TARGET VELOCITY DATA D14 FROM USER-SET DATA D12
p5
EXECUTE FIRST SHOT
CARRY OUT FEEDBACK CONTROL BASED ON TIME-SERIES POSITION COMMAND DATA D13 AND POSITION FEEDBACK DATA D16, AND IN PARALLEL WITH THIS, RECORD POSITION FEEDBACK DATA D16 AND AMPLIFIER COMMAND DATA D17
p51
p6
PREPARE SECOND SHOT
p61
GENERATE DETECTED VELOCITY DATA D15 FROM POSITION FEED BACK DATA D16
p62
ADVANCE PHASE OF DETECTED VELOCITY DATA D15 BY DELAY Td, COMPARE WITH TARGET VELOCITY DATA D14 AND GENERATE CORRECTION VALUE DATA D18 FROM DIFFERENCE
p63
ADD CORRECTION VALUE DATA D18 TO AMPLIFIER COMMAND DATA D17 RECORDED AT PREVIOUS SHOT AND WRITE IN AUXILIARY AMPLIFIER COMMAND DATA (THEREAFTER, TRANSFER TO AMPLIFIER COMMAND DATA D17)
p7
EXECUTE SECOND SHOT
CARRY OUT OPEN LOOP CONTROL BY SEQUENTIALLY READING VALUES OF AMPLIFIER COMMAND DATA D17 AND IN PARALLEL WITH THIS, RECORD POSITION FEEDBACK DATA D16
p71